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STATE OF THE ART OF DIAL ACCESS INFORMATION RETRIEVAL.
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THIS REPORT COVERS A REVIEW OF THE LITERATURE ON THE DIAL ACCESS INFORMATION SYSTEMS (DAIRS), USED FOR RETRIEVING AND TRANSMITTING AUDIO AND/OR VISUAL INSTRUCTIONAL MATERIALS TO CARRELS OR CLASSROOMS ELECTRONICALLY. AFTER FORMULATING A WORKING DEFINITION OF THE SUBJECT, A CLASSIFICATION SYSTEM AND SPECIFIC SUBJECT HEADINGS FOR USE IN THE SEARCH WERE DEVELOPED, AND WRITTEN DOCUMENTS ON THE SYSTEM'S TECHNICAL AND INSTRUCTIONAL ASPECTS WERE SURVEYED. IT WAS FOUND THAT THERE IS A PAUCITY OF LITERATURE ON THE SUBJECT, INDICATING THE RECENT, RAPID EMERGENCE OF DAIRS. BECAUSE OF THE GROWING POPULARITY OF DIAL ACCESS SYSTEMS, THE NEED FOR RESEARCH AND EVALUATIVE STUDIES IN BECOMING INCREASINGLY IMPORTANT. THE LITERATURE SEARCH ALSO SHOWED THAT SOME EDUCATORS SEE A MAJOR TECHNOLOGICAL REVOLUTION IN THE EDUCATIONAL FIELD, AND THERE IS A TREND FOR DAIRS TO BE USED IN DEPARTMENTS OUTSIDE THE FOREIGN LANGUAGE LABORATORY, FOR WHICH IT WAS ORIGINALLY INSTALLED. IN THE FUTURE, INFORMATION DERIVED FROM THE CONTINUED SURVEY OF THE LITERATURE AND DIAL ACCESS SYSTEMS IN OPERATION, TOGETHER WITH AN ANALYSIS OF USERS' EXPERIENCES OBTAINED FROM ON-SITE VISITS, WILL BE COMPILED IN A GUIDELINES HANDBOOK FOR EDUCATORS. A 45 ITEM BIBLIOGRAPHY AND GLOSSARY ARE INCLUDED, AND APPENDIXES LIST SOURCES USED IN REVIEWING THE LITERATURE, THE DAIRS PROJECT INFORMATION CLASSIFICATION, THE SUBJECT HEADINS USED, AN EQUIPMENT SURVEY, AND TITLES OF PERIODICALS THAT GIVE INFORMATION ON DAIRS. (JB)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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State of the Art Study of Dial Access Information Retrieval

Interim Report on Library Research
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C Subject Heading Classification System

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INTRODUCTION

The purpose of the literature study has been to compile and record data on existing Dial Access Information Retrieval Systems as described in available written documents. Technical and instructional aspects constituted a dual focus for the study. The technical aspects included planning and implementation stages of installing a system, the types of equipment installed, including the capacity of the system and the costs and financing of these systems. The instructional aspects included consideration of the extent of involvement of the faculty and student body and their acceptance or rejection of the system, as well as the sources of the instructional materials.

The need for people who could understand and speak foreign languages during World War II accelerated the use of audio-visual materials in the instructional process. Phonograph records were prepared to accompany the text material, providing the student with opportunities to speak as well as to listen. The first reference to a language laboratory, then called a language studio, appears in a description of an experiment "to provide intensive individualized oral and aural training" at Green Mountain Junior College. (4) There seems little doubt that the language laboratories, which had a mushroom-like growth as a result of federal funds being available for installations under Title III of the National Defense Education Act, were the forerunners to Dial Access Information Retrieval Systems.

The feasibility of using conventional dial selectors and associated switching systems to permit individual students to access instructional material was first considered by Dr. F. Rand Morton, when he was on the faculty of the University of California at Riverside. Preliminary plans were developed with the help of representatives of the Bell Telephone Company. Subsequently, Dr. Morton went to the University of Michigan where, in 1961, the first "Dialog" Language Laboratory was installed with 108 audio channels. In the same year, Trinity College in Hartford, Connecticut, installed a "Dialog System", thus leading the way in New England.

When the Yale language laboratory moved to new facilities, the English and Music Departments expressed interest in using the facilities for readings in poetry, and music recordings. When Connecticut University installed a dial access facility in 1964, plans were made to use it for several subjects other than foreign languages. Grand Valley State College in Michigan had the first system with both audio and visual capabilities. In 1965, a Dial Access Information Retrieval System was installed in a six-story Learning Center at Oral Roberts University in Tulsa, Oklahoma, which also housed the library, auditoria and classrooms. There were 130 student carrels in the original installation. Oklahoma Christian College has a similar configuration consisting of 870 carrels.

Here each student rents his own carrel for a fee of $30.00 per semester, but the system is audio only. At Ohio State University in Columbus, Ohio, 372 carrels were installed. However, they were not used to a great extent by the students when they were centrally located on the campus.

Consequently, additional carrels were decentralized and located in classroom buildings, dormitories, the student union, and the library. When the carrels were more readily accessible the students used them. These three large installations in 1965 mark the breakthrough of DAIRS and the proliferation of installations in the last two years. A more unique method of using dial access has taken place in the small community of Inverness, Montana, where the facilities are being made available to the community as well as to the high school students.

As a result of the rapid rate of development of Dial Access Information Retrieval Systems throughout the country, there is no reliable information about the existing installations or about installations being planned. Nor does there seem to be any accumulation of material on "best practices", or mechanical and/or electronic difficulties encountered. Little is known about the best methods of approaching faculty members in an effort to gain their support for the installation. And last, but far from least, there is not

a comprehensive accumulation of evidence which might support or negate consideration of installing a Dial Access Information Retrieval System.

The objectives of this study are: 1) to obtain such information, 2) to organize the data in a meaningful fashion and 3) to prepare a Guideline Handbook. This Handbook will contain information that could be used to facilitate the implementation of dial access in the future.

METHODS AND PROCEDURES OF INVESTIGATION OF THE LITERATURE

The first step in the investigation of the literature on The State of the Art Study of Dial Access Information Retrieval Systems was the formulation of a working definition of the subject, "Dial Access Information Retrieval Systems", and a delimiting of the subject matter.

The classical studies and writings of Travers on the Theory of Transmission of Audiovisual Information, Bushnell on Automation of School Information and Computers in Education, Gerard on Computer Mind Shaping and Stewart's Cost Analysis of Dial-Access Information Retrieval Systems served as the basis for initiating the review of the literature. (See Bibliography)

A DAIRS Project Information Classification Scheme was devised. This classification system served as the basis for the identification of specific subject headings, the glossary terminology, and as the criteria for reviewing the literature as well as an index for the installation and identification card filing system. Key Word Categories (using whole numbers for identification) and Entry Descriptors (using decimal numbers for identification) were established. The data was divided into two categories, technical and instructional.

Once a working definition of the subject had been developed, the next procedure was the identification of appropriate sources where relevant materials would be found. Decisions for selection of the libraries to be used were based upon the nature of the project and specific subject headings.

The specific subject headings were derived from the basic classification system and from the different types of media considered in the review of the literature.

Sources used in the search included both published and unpublished, printed as well as audio-visual materials. Among the unpublished sources were the card catalogs of each designated library, unpublished bibliographies, vertical files, and individual and institutional authorities. The published sources included books, bibliographies, research projects (terminated and in progress), indexes, pamphlets, periodicals, guides to literature, reports, and records of symposia.

The next step was the identification and location of items. Unfortunately, the subject headings chosen did not yield any material on dial access systems since the term "Dial Access" has apparently come into usage very recently. Consequently, the subject headings were revised and expanded, but the continued search, operating with the changed headings, did not uncover much

additional literature pertinent to dial access. Finally the professional and technical journals were searched and pertinent articles were xeroxed and later abstracted.

The search for other kinds of materials and other works relevant to the study was somewhat simplified since cues were found in the journals. Some material that had not been described or analyzed was identified by members of the team. An example of such material is an unpublished Master's paper by a student at the University of Pittsburgh. Other leads to applicable material were found in footnotes, references, and bibliographies of the works reviewed.

RESULTS

A. Study of available sources prior to the literature search validated Stewart's operational definition for "Dial Access Information Retrieval Systems" which had been referred to in the original proposal. This definition is:"DAIRS is a system involving two or more receivers (students) who are able to select and receive any one of two or more stored programs (audio and/or visual) from a source which is at a location different from that of the receivers, the transmission from the source to the receiver being wholly or in part electronic." (7)

B. The search of the literature excluded installations using dial access exclusively for language laboratories and computer systems. Categories of instructional uses of dial access covered in items of the Dial Access Inventory sent to institutions include:

1) Prime method of presenting course content
2) Teacher mediated instruction
3) Review of course content and enrichment
4) Remedial and miscellaneous uses of dial access.

C. The following sources were used in reviewing the literature: research projects, reports, professional and technical journals, (periodicals), DDC and Xerox compilations of subject headings, (DDC mentioned above is the Defense Documentation Center), college and university thesis papers in graduate studies, and business reports of hardware suppliers. (See Exhibit A of the Appendix)

D. Actual contacts with individual authorities working in the field of dial access systems provided leads and hidden references that were of some value.

E. A numerical classification of all elements in DAIRS subject matter was compiled. (See Exhibit B in Appendix). This classification scheme was basic to the Dial Access Inventory construction.

F. A classification by subject headings for DAIRS materials found in the literature was compiled (See Exhibit C in Appendix) This classification scheme also was basic to the Dial Access Inventory construction.

G. A Glossary of Terminology was selected and compiled from the literature searched, which will be useful in analyzing the returns of the Dial Access Inventory. (See Glossary)

H. A complete list of abstracts pertinent to dial access was compiled and a current card file of abstracts was created. (See Exhibit D in Appendix)

I. Some items cited in footnotes, references and bibliographies of the material searched were found to be pertinent.

J. An equipment survey of existing dial access systems in the United States was made and a card file for each of the 50 states was compiled, noting descriptive information on the institutions and installations significant for this study. (See Exhibit E in Appendix)

K. Virtually nothing was found of any usefulness to our study from the numerous subject headings searched on the subject of dial access and related systems. Discussions of one installation of DAIRS at the elementary level, two at the junior high school level, five at the high school level and eleven at institutions of higher learning were found.

DISCUSSION

The use of the term "dial access" was not generally applied in identifying information in this subject matter. However, some fruitful results were obtained by scanning the journals and thesis papers in publications of professional, educational and technical researchers in the trade areas and in the files of various university departments.

The amount of information in areas of education, training and educational technology is increasing so rapidly that our efforts to do a comprehensive search of the literature, and our experiences therein, indicated a definite need for a computerized bank of information that could be readily retrievable. The logical place for such information storage would be within the U. S. Office of Education.

In addition to decreasing the possibility of duplication of efforts, such a Center would encourage necessary research in the vital field of new educational technology.

One example of the need for a centralized information bank is the fact that of the numerous subject headings searched on the subject of dial access and related systems, no satisfactory indexing was possible.

Relevant materials found were used in searching educational and technical indexes, but these produced nothing of value for our study. Next, we expanded and elaborated on subject headings to include different types of media, but the information obtained was fragmentary. The most reliable evidence that a saturation point had been reached in our search, was the occurrence of identical

material in two different sources or indexes, that is, in business or educational indexes, and in industry and applied science or technology indexes.

Probably the richest source of information obtained was the contacts with individual authorities using or planning to use dial access. Fortunately, many opportunities for such contacts were provided at the seminars on Dial Access Information Retrieval Systems, sponsored by the Division of Audiovisual Instruction of the National Education Association, and held at Oklahoma Christian College in late September 1967, and at Hall High School, West Hartford, Connecticut, in early November 1967. Much of the information obtained at these seminars will be discussed in the Conclusions, Implications, and Recommendations section of this report.

There appears to be somewhat of a paradox, since there is a paucity of literature that can be found pertaining to dial access and an enthusiasm reflected by users and equipment manufacturers accompanying their discussions of the rapid growth of DAIRS.

Some of the factors being considered are:

1) The types of equipment
2) The capacity, capability and flexibility of the systems
3) The cost and financing
4) The instructional preparation and use as well as
5) Student-faculty involvement.

Various institutions have settled their problems in different ways - but all with the same end in mind.

The size of DAIRS varies greatly - from small systems of 20 or less carrels - to large installations of mammoth proportions. Virtually all the systems provide study carrels where students can receive instructions through a variety of media. The largest portion of the material is presented via audiotapes - with video displays being less common, but increasing in frequency of inclusion.

Much of the software that is currently being used in school systems throughout the nation is commercially prepared and packaged. Individual schools or systems purchase this material if they feel it meets the requirements of the curriculum. In some instances a special system may be developed by a company - for a purchaser who has developed functional specifications.

Some of the equipment permits students to dial into lectures as they begin at a pre-scheduled time. Other devices provide reference tapes or lectures to individual students who dial a number for such prescribed tapes. By means of a telephone hook-up, students can be linked to outstanding teachers or authorities in distant locations - or there may be special viewing rooms where groups of students may be provided with dial and loud speakers for recorded presentations or "telelectures".

Many began with the systems installation of a small number of carrels and correspondingly few programs. However, since virtually all plan to expand, there appears to be a trend to design systems incorporating

room for expansion built in. Attempts are made to locate carrels in areas where there is room to add more - or provisions are made for including carrels in areas other than the original place of installation. Preliminary investigations indicate that usage rises dramatically when carrels are installed in dormitories and student centers. Easy accessability therefore will be an important consideration for institutions planning remote installations. Perhaps prime consideration would be whether or not to allow for individually assigned carrels.

CONCLUSIONS

The paucity of literature in any meaningful terms is indicative of the rapid emergence of DAIRS within the past several years and the short period of operation that most users have had to assess results. Because of the increasing interest and popularity of dial access systems, the need for solid research and evaluation studies is becoming ever more important. It is necessary to assess and determine how DAIRS will relate to other technologies in education, such as ITV and CAI. The rise of specialists promoting their own technologies poses the problem of developing generalists with the knowledge and perspective to see the whole picture in each instructional situation.

DAIRS, as a new technological innovation, must be analyzed to determine its effectiveness in meeting educational objectives. Institutions planning for its use must clearly define its interfaces with the traditional curriculum. In the words of Commissioner Harold Howe, "The real question is not what is new, but, rather, how can the new best be used...The so-called new media...have frequently been prematurely introduced before either adequate content or reliable evaluation has been available. The result has been all too often a wave of hasty enthusiasm for the promise of a new technology or device, followed by a more leisurely repentance when it fails to live up to its billing." (5)

What personal evaluations have been forthcoming from existing literature and from users of dial access systems provide the following conclusions for the introduction and use of this new technology:

1) To achieve faculty involvement, participation and commitment. Planning committees should exist as long as there is a program.

2) To define the educational objectives and functions before contracting for a system and then build the system to answer the needs. The electronic equipment should serve the program rather than the program being designed around the eqipment.

3) To provide flexibility and expandability to the system. The program should grow in a step-by-step manner as materials are developed and used. As a rule, start small, expanding as feasible. The size of a dial access system depends upon its use. The majority of installations are audio only, partially due to the cost factor in video systems.

4) To begin with adequate program sources and teacher involvement in the selection of audio and visual instructional materials. Preparation of materials may be simplified for them through the provision of competent technical assistance.

5) To give the teachers as much autonomy as possible in the selection of materials. Prepared courses or materials should not be superimposed upon them.

6) To orient the teachers to the system and its operation.

7) To restructure the organization of teacher time to provide time for teachers to prepare materials.

8) To obtain technical consultation in preparing system specifications after the functional specifications have been prepared. A qualified local contractor should be employed to install and maintain the equipment and to train staff in operation and maintenance as required.

9) To have some software available when the hardware arrives so that the system can become operational upon installation.

Although some degree of resistance to technological innovation may be assumed, it can be modified by involving the teachers in the planning stages. The rationale of a dial access system can be meaningful to both teachers and students since it provides a simplified method of using audio and/or video resources by eliminating the problems of transporting audiovisual equipment and programs into the classroom or study carrel. Its ease of operation provides prompt access to needed material. Flexibility is inherent in the system since it can serve individuals as well as small or large groups, providing retrieval, automatic scheduling, or manual operation. The existence of a central point at which changes in instructional and enrichment programming may be made is a decided advantage.

The teacher, relieved of transmitting factual course content, has more time available for interaction with students.

Quite often the material recorded is better than a "live performance" since it is presented by a teacher at his optimum level of performance. Students may benefit from the self-pacing option provided by the system as well as the ready availability of subject matter content, and make up lessons due to health or other absences when needed. For example, if a student is absent for some period of time due to illness, the process of catching-up is simplified.

Individualized instruction, with the teacher assuming the role of the manager of learning resources for each student rather than a dispenser of subject matter, is made possible by dial access. According to Don D. Bushnell, the most efficient use of information retrieval systems in education requires a total systems approach. (3)

SUMMARY

This Interim Report is concerned with reviewing all the literature available which pertained to Dial Access Information Retrieval Systems.. In the early stages of the literature search, it was discovered that it would be quite difficult to locate material pertaining to DAIRS because of the lack of identification of key words, particularly the word "dial". The terms used included audiovisual, information retrieval, telephone, remote access, automated learning, random access, electronics in education, and data processing information retrieval. Other topics included media oriented articles and numerous subtopics.

There was only one article pertaining to DAIRS in ERIC and it was concerned with the entire Learning Center at Oklahoma Christian College. The most lucrative resources proved to be scientific, professional, and technological journals. However, articles found in these journals were not indexed by terms or key words specifically related to the subject. This appears to indicate an existing need for the establishment of a glossary to be used in indexing materials pertinent or relevant to Dial Access Information Retrieval Systems. (See Glossary)

It is recommended that a fragmentary approach to the problem of information storage and retrieval in the field of education be eschewed and that plans be made by the U.S. Office of Education for a computerized bank of information in a readily retrievable form.

Possibly the answer to the present dilemma would be found in the implementation of NEA's George Arnstein's proposal that a Bureau for

Educational Technology and Administration (BETA) be established to serve as a clearinghouse to collect, index, organize, and disseminate information. (1) Perhaps the newly organized Instructional Equipment Development Branch constitutes a step in the right direction.

The literature reflects the realization on the part of some educators that we are on the threshhold of a major technological revolution that will be of great assistance in the learning process. There appears to be some apprehension on the part of some teachers who fear competition from automation rather than perceiving it as an extension of their roles. Commissioner Howe frequently has pointed out the fact that the new technology will foster relationships with greater interaction between students and teachers than is possible in conventional classrooms.(6)

Another factor that appears to be inhibiting the implementation of educational technology in the schools is that many administrators attempt to mix a systems approach with the traditional locked step classroom, the compartmentalization of subject matter, and arbitrarily determined periods of live assemblage. In the process, the advantages of the systems approach are markedly diluted or eliminated and the traditional approach also loses some of its effectiveness in some instances.

One interesting observation is the fact that "educational television... automatically led to team-teaching." (2) Possibly it is the team-teaching concept that will provide teachers with sufficient time to prepare learning materials for use in DAIRS. There is no question that the lack of a sufficient number of good programs that have been

tested and validated has caused many school administrators to delay the installation of DAIRS. Nor is there any question that many school administrators are awaiting further improvements in the equipment (hardware) such as the dubber or buffer being developed by CBS and Ampex which will provide instant copies of tapes, enabling dialers to enter a given program at any time. It may be that others are waiting for published data on the cost effectiveness of operating DAIRS. Significant findings should be forthcoming in the next year or two.

There appears to be somewhat of a trend for DAIRS, originally installed exclusively for foreign language laboratories, to be utilized by other academic departments. Some computer assisted instruction (CAI) exists in the schools and colleges. Since there exists not only an interface between language laboratories, CAI, and DAIRS, but an actual overlap in many instances, the three of them should be classified in some common fashion.

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Unknown. "Space for Individual Learning," Educational Executives Overview. V 4, N 3, March 1963. p. 29-40.

Unknown. "Technology in Education," Education U. S. A. Special Report, National School Public Relations Association.

Unknown. "The Open Secret at Oakland," Data Process. V 10, N 3, September 1967. p. 10-13.

Unknown. "Waterbury Students Dial Lessons in Study of Languages," Waterbury American. February 26, 1964.

GLOSSARY

ACCEPTOR - an institution that has used and will continue to use dial access systems as an integral part of the curriculum and/or in a supplementary and enrichment capacity.

AUDIO DUPLICATING SYSTEM - equipment designed primarily for the duplication of tapes, or placing information from a number of tapes onto a single tape.

AUDIO MASTER TAPE TRANSPORT - the equipment used to play back information on audio tape and/or in conjunction with other equipment, to record information on audio tape. These transporters are normally located at a remote location but need not be necessarily.

AUDIO STUDENT TAPE TRANSPORT - the device used to record student responses and/or play back audio information to students. The operation of the recorder may be under the control of the student and may be remotely located.

AUDIO SWITCHING EQUIPMENT - the equipment used to channel the appropriate audio program to the student making the request.

AUDIO SYSTEM PROCESSOR - the equipment facilitating audio program control.

AUDIO SYSTEM SPECIFICATION - the characteristic of an overall audio system including all components: sound transducers; audio transmission; recording and playback devices.

COST EFFECTIVENESS - the product of an analysis of materials, equipment, procedures among many variables wherein a decision is made to adopt a program when it can be proven that a reasonable dollar return will accrue from each dollar invested.

DIAL ACCESS - a system involving two or more receivers (students) who are able to select and receive any one of two or more stored programs (audio and/or visual) from a source which is at a location different from that of the receivers, the transmission from the source to the receiver being wholly or in part electronic.

EDUCATIONAL TECHNOLOGY - the systematic integration of human engineering, technological innovations, principles of learning and structure of the subject matter discipline to achieve desired educational objectives. Processes leading to the production of validated and reliable learning systems which can be replicated, involving the completion of a set of tasks for desired purposes of learning.

EDUCATIONAL SPECIFICATIONS - a description of an identifiable category of educational information which includes information needed, basic source, rationale, and time schedule for collection.

EQUIPMENT - an item of nonexpendable nature, a movable or fixed unit of furniture or furnishings, an instrument or apparatus, a machine, an instructional device, or a set of small articles, which retains its identity over a period of time.

FEEDBACK - the partial reversion of the effects of a process to its source or to a preceding stage.

FLOW CHART - a graphic representation of the major steps of work in progress; synonymous with process chart and flow diagram.

FUND - a sum of money or other resources set aside for specific activities of a school district. The fund accounts constitute a complete entity and all of the financial transactions for the particular fund are recorded in them.

HARDWARE - technological equipment for the storage, retrieval and/or presentation of information, (e.g. computer and dial access) and providing interface between students and software.

INTERFACE - a common boundary between systems or parts of a system.

INSTRUCTION - the use of any specifiable means of controlling or manipulating a sequence of events to produce modifications of behavior through learning, the outcomes of which can be specified in sufficiently explicit terms to permit their measurement.

INSTRUCTIONAL GUIDE - published material providing user of instructional materials information about the uses and objectives of the materials.

INSTRUCTIONAL PROGRAM - the curriculum and its implementation.

INSTRUCTIONAL RESOURCES - teaching materials and equipment and the means of implementing their interaction.

OFF-THE-SHELF-MATERIALS - prepared learning materials available from publishers and producers of educational products.

PARAMETER - a quantity which may have various values, each fixed within the limits of a stated case; or an arbitrary constant, each of whose values characterize a member of the system.

PERT - Program Evaluation and Review Technique - a procedure that provides a method of planning, a method of replanning, and progress evaluation to better control a major research and development program.

PROCEDURE - a precise step-by-step method which can be replicated for accomplishing a task or effecting a solution to a problem.

PROGRAM - (1) an instructional unit: a series of instructional units. (2) a definable activity of an educational agency; a cluster of related activities.

PROGRAM AMPLIFIER - the equipment used to amplify the level of the signal emanating from the audio or video playback device. A program amplifier is sometimes an integral part of an audio or video tape transport, in which case it may not be identified as a separate unit.

PROGRAM CONTROL - the equipment used to control the manner in which students are permitted access to programs.

PROGRAMMED INSTRUCTION - a design of a curriculum wherein all relevant methods, techniques, media, and devices, among others are carefully sequenced to insure a successful learning experience.

RANDOM ACCESS - equipment capability wherein the user can select any of a number of stored programs remotely located.

RANDOM ACCESS TAPE SEGMENT CONTROL - a method of searching for, stopping at, and playing a portion of a tape that has been indexed or marked in some way.

REJECTOR - an institution that has used but will decrease or eliminate its use of dial access systems in the future. An institution that has considered dial access system and rejected it.

SELECT DEVICES - the device used by the student to select a program. The device could be dial, push-button, digital counter, etc.

STUDENT RECORDER - tape recorder used directly by the student. Recorder may be located remotely or at the student station. (Also see Audio Student Tape Transport)

STUDENT RESPONSE MODE - the ways in which students may communicate with the equipment, as via microphone, push-button, dial, etc.

TV DISPLAY - device used for viewing televised materials or programs.

SOFTWARE - The language, stimuli, or system of "input" into hardware (any technological distribution channel or equipment) by which messages or ideas are contained through sequencing, animation, format, etc., for presentation by such media as films, printed texts, audio tapes, video tapes, teaching machines and computer terminals.

SYSTEM - a plan of interrelated and independent components united by the purpose of accomplishing a goal or solving a problem. The system must specify starting and ending points, how objectives are to be measured, a clear definition of the constraints, synthesis of various possible solutions, establishments of cost elements, continuous evaluation.

VIDEO TAPE DRIVE - the equipment used to play back information on video tape and/or in conjunction with other equipment, to record information on video tape.

VIDEO SWITCHING EQUIPMENT - the equipment used to channel the appropriate video program to the student making the request.

VIDEO SYSTEM PROCESSOR - the equipment facilitating video program control.

APPENDIXES

SOURCES USED IN REVIEWING THE LITERATURE

RESEARCH PROJECT REPORTS

Current Project Information, July 1967
Educational Research Information Center, Research in Education
(All issues up to current ones)
Projects in Print, 1964-1967
U. S. Government Research and Development Reports, 1966-1967

PROFESSIONAL AND TECHNICAL JOURNALS

ALA Bulletins
America
American Documentation
American Education
American Educational Research Journal
American Engineer
American Scholar
American School and University (Plant Planning and Purchasing)
American Statistician
Architectural Record
Arkansas Libraries
Audiovisual Instruction
Automated Education
A-V Communications Review
BTL Talks and Papers, 1965
Business Education Forum
Business Education World
Business Management
Business Screen
Business Week
California Librarian
California School Libraries
Canadian Library
Catholic School Journal
Changing Times
Collegiate News and Views
College Newsletter
College and Research Libraries
College and Research Libraries News Supplement
College and University
College and University Journal
College and University Business
Communications
Dartmouth College, Baker Library Bulletin
Data Processing for Education
Education
Education Communication Review
Education Digest
Education Extension Service

Education Quarterly
Education Screen and AV Guide
Education Summary
Education, U.S.A.
Educational Technology
Electronic Products
Focus on Indiana Libraries
Grade Teacher
Harvard Business Review
High School Journal
Higher Education in New England
Idaho Librarian
Ideas Education
Illinois Libraries
Improving College and University Teaching
Industrial Design
Information Storage and Retrieval
Instructor
Iowa Library Quarterly
Journal of Documentation
Journal of Educational Research
Journal of Educational Processing
Journal of Industrial Engineering
Journal of Secondary Education
Journal of Teacher Education
Junior College Journal
Kansas Library Bulletin
Library Resources and Technical Services
Library Technology Reports
Library Trends
Maine Library Association Bulletin
Maryland Libraries
Michigan Libraries
Minnesota Libraries
Mississippi Library News
Missouri Library Association Quarterly
Montana Libraries
NPG Construction Reports
NAEB Journal
National Review
Nation's Schools
Nature
NEA Journal
Nevada Libraries
New Mexico Library Bulletin
News Notes of California Libraries
North Carolina Libraries
North Country Librarian
NSPI Journal
Phi Delta Kappan
Pioneer
Produced Information for Schools
PTA Magazine
Publishers' Weekly

Saturday Review
School Libraries
School Life
School Management
School Record
School Review
School and Society
Scientific Research
Special Libraries
This Electronic Age
Time
Top of the News
U. S. News and World Report
Wilson Library Bulletin

GUIDES TO LITERATURE

Applied Science and Technology Index, 1965-1967
Architectural Catalog File, 1966
(Classified Collection of Manufacturer's Catalogs)
Architectural Index, 1965-1967
Bibliographic Index, 1964-1967
Business Periodicals Index, 1965-1967
Dissertation Abstracts, 1966-1967
Education Index, 1956-1967
Engineering Index, Inc., 1965-67
Guide to Master's Theses, 1964-1967
Library Science Abstracts, 1956-1967
Doctor's Dissertations in Progress and Completed, 1965-1966

DATRIX (Direct Access to Reference Information: Xerox Service)

Keywords:

access
audio
audiovisual
automat
data
dial
computer
electronic
learning
library
random
remote
information
retrieval
study

DEFENSE DOCUMENTATION CENTER: A REPORT BIBLIOGRAPHY

Keywords:

education
remote access systems

DAIRS PROJECT INFORMATION CLASSIFICATION

WHOLE NUMBERS (1) KEY WORD CATEGORIES
DECIMAL NUMBERS (1.1) ENTRY DESCRIPTORS

TECHNICAL

1. RECEPTION
   - 1.1. Type of Reception:
     - 1.11. Audio
     - 1.12. Video
     - 1.13. Audio/Video

c. CARRELS
   - 2.1. Number of Carrels:
     - 2.11. Audio
     - 2.12. Video
     - 2.13. Audio/Video
   - 2.2. Location:
     - 2.21. Library, classrooms, lecture halls, dormitories, other
     - 2.22. Onsite and/or offsite of educational institution
   - 2.3. Environment:
     - 2.31. Individual reception
     - 2.32. Group reception (classrooms, lecture halls, other)
     - 2.33. Supplementary audio/video materials and equipment provided in carrels (projectors, microfilm readers, workbooks, other)
     - 2.34. Physical description of carrel (construction, carpeting, acoustics, lighting, other)

3. CAPACITY
   - 3.1. Program Capacity of the System:
     - 3.11. Number of audio programs
     - 3.12. Number of video programs
     - 3.13. Number of audio/video programs
     - 3.14. Supplementary manually operated programs

4. EQUIPMENT
   - 4.1. Control Equipment Description:
     - 4.11. Number of cartridge playback units
     - 4.12. Number of tape decks
     - 4.13. Single tape with multi-tracks
     - 4.14. Playback only or record playback
     - 4.15. Number of TV channels for video tape, live programming, film, open-circuit reception
   - 4.2. Equipment Capability:
     - 4.21. Tape, disc, video tape, film, live TV, slides, microfilm, commercial/ETV channels
     - 4.22. Immediate access to complete program without waiting or joining in progress

5. LOCATION
   - 5.1. Location of Technical Control Center for Program Transmission
   - 5.2. Nearness to Related Services for Convenience and/or Economy:
     - 5.21. Carrels
     - 5.22. Recording and production facilities
     - 5.23. Library, resource center, or instructional materials center
   - 5.3. Transmission Mode:
     - 5.31. Telephone lines/coaxial cable
     - 5.32. Other (multiplex, FM, VHF, UHF, 2500 megahertz)
     - 5.33. Program selection mode (dial, push button, digital, rotary switch)

6. COST
   - 6.1. Breakdown and Analysis of Equipment Variables:
     - 6.11. Student or receiver locations:
       - 6.111. Number for individual use
       - 6.112. Number for group use
       - 6.113. Use and kind of equipment in carrel (microphones, recording and playback, part of or separate from system, other)
       - 6.114. Number of stations with video
         - 6.1141. Slow scan TV (slides, filmstrips)
         - 6.1142. Regular TV (separate or regular DAIRS distribution system)
         - 6.1143. Number for individual viewing (screen size)
         - 6.1144. Group viewing (screen size, monitors, projection TV)
       - 6.115. Supplementary materials
         - 6.1151. Tape recorders, projectors, microscopes, kits, workbooks, other
       - 6.116. Expansion plans:
         - 6.1161. Number of carrels
     - 6.12. Transmission:
       - 6.121. Distance between receiver location and source programs
       - 6.122. Number of locations already connected
     - 6.13. Switching system:
       - 6.131. Number of receivers with simultaneous or almost simultaneous access to stored programs
     - 6.14. Source:
       - 6.141. Number of program sources to be available at any one time for student retrieval:
         - 6.1411. Audio
         - 6.1412. Video
         - 6.1413. Audio/Video

6.142. Number of programs available on scheduled basis:
- 6.1421. With remote control (stop, start, record, playback capability)

6.143. Number of program sources available for random access by student request to an attendant

6.144. Kind of storage medium to be used
- 6.1441. Audio programs on single-track recorder
- 6.1442. Audio programs on double-track recorder
- 6.1443. Audio programs on 4-track recorder
- 6.1444. Audio programs on multi-track hi-speed computer-controlled access recorders
- 6.1445. Video programs on single program video recorders
- 6.1446. Video programs on multi-program hi-speed computer-controlled access recorders
- 6.1447. Video programs stored on 8mm film projector, 16mm projector, cartridge film projector, or slide carousels available via interface equipment and TV cameras

6.145. Video expansion plans:
- 6.1451. Number of programs
- 6.1452. Subject area

7. FINANCING
   - 7.1. Financing of Equipment:
     - 7.11. Federal grants and loans
     - 7.12. State grants and loans
     - 7.13. Community school appropriations
     - 7.14. Foundation grants
     - 7.15. Private grants

8. SUPPLIER
   - 8.1. Names and Addresses of:
     - 8.11. Manufacturer
     - 8.12. Installer
     - 8.13. Technical consultants and designer

9. EXPANSION
   - 9.1. Planned Expansion of Facilities in:
     - 9.11. Additional carrels
     - 9.12. Capacity for number of programs
     - 9.13. Capability in audio and/or video
     - 9.14. Diversification of subject matter

INSTRUCTIONAL

21. LEVEL
    - 21.1. Elementary, Secondary, College, Community College, University
    - 21.2. Grades and Departments

22. SUBJECTS
    - 22.1. Specific Subjects Stored in Lesson Form:
        - 22.11. For enrichment
        - 22.12. For review and reinforcement of materials already presented
        - 22.13. For presenting regularly assigned course content available only through the system
    - 22.2. Type of Reception for Subject Material:
        - 22.21. Audio
        - 22.22. Video
        - 22.23. Audio/Video

23. POPULATION
    - 23.1. Number of Students Enrolled in Institution
    - 23.2. Number of Students Enrolled in Courses in which DAIRS is available
    - 23.3. Number of Students in Each Course Using DAIRS

24. CAPACITY
    - 24.1. Number of Programs in Use:
        - 24.11. Audio
        - 24.12. Video
        - 24.13. Audio/Video
    - 24.2. Number of Program Potential in System

25. USE
    - 25.1. Average Daily Time Use Per Participating Student
    - 25.2. Average Number of Subjects Used Per Participating Student
    - 25.3. Per Cent of DAIRS Used to Regular Curriculum
    - 25.4. Per Cent of Audio vs. Audio-Video Use
    - 25.5. Hours of Operation

26. SOURCE
    - 26.1. Source of Recorded Subject Material:
        - 26.11. Commercial (off-the-shelf or contract)
        - 26.12. Institutional exchange, rental, or purchase
        - 26.13. Local school production
        - 26.14. Consultant with faculty production

27. SUPPLEMENTS
    - 27.1. Supplementary Materials Used in Carrels:
        - 27.11. 8mm films
        - 27.12. Printed, or mimeographed materials
        - 27.13. Slides, photos
        - 27.14. Laboratory kits
        - 27.15. Other

28. MULTI-USE
    - 28.1. Student Retrieval of Daily Announcements
    - 28.2. Student-to-Teacher Call for Assistance
    - 28.3. Live Lecture Dial Capability
    - 28.4. Computer Hook-up for Problem Solving

29. FACULTY
    - 29.1. Assignment of Faculty to Program Development:
        - 29.11. Number
        - 29.12. Full-time
        - 29.13. School time
        - 29.14. Overtime or summer time
    - 29.2. Orientation and Involvement of Faculty through Advisory and Production Committees

30. ATTITUDES
    - 30.1. Students, Teachers, Administrators:
        - 30.11. On acceptance or rejection
            - 31.111. Advantages
            - 31.112. Disadvantages
        - 30.12. Degree of effectiveness in specific subject areas
            - 31.121. Advantages
            - 31.122. Disadvantages

31. PLANNING
    - 31.1. Stages and Procedures Taken in Planning:
        - 31.11. Orientation of teachers, students, administrators
        - 31.12. Visits to installations
        - 31.13. Use of consultants
        - 31.14. Personnel assignments in planning procedures
        - 31.15. Planning time

32. COST
    - 32.1. Breakdown and Analysis of Instructional Programming:
        - 32.11. Add-on programs to serve regular curriculum:
            - 32.111. Enrichment programs not specifically covered by regular course material
            - 32.112. Enrichment programs for regular course material
            - 32.113. Programs for integration into regular course materials
            - 32.114. Programs developed through systematic analysis of curriculum objectives and redesign of learner-oriented course materials
        - 32.12. Source of software:
            - 32.121. External (off-the-shelf audio and video programs)
            - 32.122. Semi-external (commercial contract to work with faculty to develop programs)

32.123. Semi-internal (use of consultants for faculty orientation and training in developing course materials)
32.124. Internal (staff members working with faculty on programs)

32.13. Plans using faculty time in developing programs:
32.131. On teachers' school time without changing teaching schedule
32.132. On overtime basis or through a reduction in teaching schedule
32.133. Use of some faculty on full time basis
32.134. Use of faculty or most of faculty on a full time basis during summer vacation

32.14. Audio and video equipment and materials available to reduce purchases necessary

32.15. Use of supplementary materials:
32.151. 8mm films
32.152. Slides
32.153. Printed materials
32.154. Laboratory kits
32.155. Other

33. OPERATIONAL
33.1. Date in Operation
33.2. Date Planned for Operation

audiovisual instruction

automation

automated education

communication skills

data processing

datapran

dial access

education

educational change

educational equipment

educational research

educational television

electronics

educational media

information retrieval

instructional film

instructional technology

media research

programmed instruction

random access

remote access

research projects

select access

school libraries

technology

television research

SAMPLE ABSTRACT

Dr. Stafford North (Dean of Instruction, Oklahoma Christian College)

"Learning Center Gives Each Student a Study Carrel".

Article from College and University Business. May 1966.

This gives a thorough picture of the Oklahoma Christian DAIRS which went into full operation on January 30, 1966, with 720 positions to access 136 program sources. The number has increased to 870 making it the largest operation of its kind.

In 1962, when planning a new library, the concept of providing a private study carrel for each student with a dial access capability to taped lesson materials took shape. A pilot dry run on a public speaking course proved the efficacy of the plan. After extensive groundwork and consultation, the learning center was constructed.

Some of the more important points in the article:

. The importance of "expandability" when building a learning center. Glass walls simplify this expansion.

. Keep it central to classrooms and dormitory areas.

. Provide the student carrel, or private study area, in an environment designed to stimulate study.

. Make it accessible throughout the day and evening.

. Make its use flexible with resources available for almost any kind of study: (1) conventional, (2) listening activities, (3) viewing and recording (film, filmstrip, and slide projectors, portable recorders for check out)

. Set up firm rules for using the carrels in order to achieve the concept of their being.

. Give prior concern and efforts to preparing materials tailored to the curriculum.

The uses of recorded materials fall into three categories:

1. Taped lectures prepared by the faculty with special emphasis on factual material and often requiring the use of work books.

2. Taped exercises involving largely drill, repetition, or memorizing.

3. Aural material such as music, poetry, drama, speeches.

Response from teachers and students has shown favorable acceptance of the system. Usage of tapes averages 3,500 calls per day or six calls per student per day. Savings in teacher time as well as classroom space is significant. But most important, students are taking an increasingly greater responsibility for their own learning.

Exhibit E

EQUIPMENT SURVEY

Early in the DAIPS project, requests were sent to 15 companies soliciting information on their equipment.

List of Manufacturers queried:

Litton Educational Technology Division, Litton Industries*

Peeves Electronics Corporation*

Forth Electric Company

Ampex Corporation

Automatic Electric Company*

Chester Electronic Laboratories, Inc.

Videosonic Systems

Continuous Progress Education, Inc.

Page-Bell Corporation, Educational Electronics Division

General Electronics Laboratories, Inc.

Radio Corporation of America: Instructional Electronics

Blonder-Tongue

Omnilab*

San Diego Engineering Inc.*

Robert C. Merchant Company

*Did not respond to inquiry.

Of those who responded, none were judged to have a sufficient range of equipment to be able to install a dial access system, and the characteristics of their equipment have been entered into the charts found on the succeeding pages. One additional

company, Omnilab, although not responding to the questionnaire, is known to have dial access equipment, and thus has also been entered on the chart.

Those companies which manufacture component parts for dial access systems but do not manufacture the necessary range of equipment to establish a dial access system, have not been included. It would be possible, of course, to incorporate their equipment into the system, but to list all companies with such equipment, would be beyond the scope of this project. To list only one or two would be an injustice to the others, therefore, no such companies are included on the charts.

THE SPECIFICATIONS

The specifications for the equipment supplied by the companies responding to our letters of inquiry are contained in six charts appearing on following pages.

The information is presented on the charts as follows:

Chart 1. AUDIO TAPE TRANSPORTS

- A. Master Tape Transports
- B. Student Tape Transports

Chart 2. AUDIO AND VIDEO SWITCHING UNITS

- A. Audio Switching
- B. Video Switching

Chart 3. VIDEO SOURCES AND SYSTEMS SPECIFICATIONS

- A. Video Tape Drives
- B. Other Video Sources
- C. Audio System Specifications

Chart 4. PROGRAM AMPLIFIERS AND PROGRAM CONTROL

A. Playback and Program Amplifiers

B. Audio System Processors

C. Video System Processors

Chart 5. CARRELS AND ASSOCIATED EQUIPMENT

A. Carrel Dimensions

B. TV Displays

C. Auxiliary Audio Units

D. Student Response Modes

E. Program Select Devices

F. Other Facilities

Chart 6. RELATED EQUIPMENT

A. Audio Duplicating System

B. Random Access Tape Segment Control

C. Other Equipment

It should be kept in mind, while reading the following charts, that only the most flexible equipment of the company is listed. Frequently, the manufacturer can provide equipment with lesser capability. The information contained in the charts was obtained solely from the literature they supplied, and may or may not reflect the true range of their equipment's capabilities. It is anticipated that by the time the Guidelines Handbook is published, the terminal objective of this project, much more complete data will be available, and entered into the charts.

		A	B	C	D	E	F	G	H	I	J	

		A	B	C	D	E	F	G	H	I	J	

		A	B	C	D	E	F	G	H	I	J	

		A	B	C	D	E	F	G	H	I	J	

		A	B	C	D	E	F	G	H	I	J	

		A	B	C	D	E	F	G	H	I	J	

Exhibit F

SOURCES YIELDING APPLICABLE INFORMATION OR DATA

	JOURNALS AND PERIODICALS	No. of Articles
1.	American School and Management	1
2.	American School and University	1
3.	Architectural Record	1
4.	Audiovisual Instruction	10
5.	Bell Telephone Magazine	1
6.	Business Education World	1
7.	California Librarian	1
8.	College and University Business	1
9.	Data Process	1
10.	Harvard Educational Review	4
11.	Educational Executives Overview	1
12.	International Science and Technology	1
13.	National Association of Educational Broadcasters Journal	1
14.	The National Observer	1
15.	Nation's Schools	4
16.	The New Haven Register	1
17.	Phi Delta Kappan	1
18.	Pioneer	1
19.	Saturday Review	1
20.	School Library Journal	4
21.	School Product News	1
22.	Tennessee Teacher	1
23.	Time Magazine	1
24.	View	1
25.	Waterbury American	1

F-1